Serial No.: 10/017,388
Art Unit: 2623
Filed December 18, 2001

REMARKS/ARGUMENTS

Claims 1-20 are pending in this application. By this amendment, claim 4 has been amended to correct a translation/clerical error and new claim 21 has been added.

The Examiner has rejected claims 1-11 and 13-20 under 35 U.S.C. 102(e) as being anticipated by Nakagawa et al. (U.S. Patent No. 5,831,619). The Examiner has also rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakagawa and Shinagawa (US Patent No. 6,018,592).

Nakagawa is directed to an image generation apparatus for generating an image of a three dimensional object from a viewpoint. In particular, Nakagawa describes first aquiring images of a three dimentsional object from a plurality of positions around the object. Nakagawa then makes use of an address generating unit that, upon receiving a specified viewpoint, calculates a first address showing the position of a particular image acquistion and a second address showing the position corresponding with the direction of the line of sign in the image determined according to the first address. The image determined from the first address is combined with the information in the second address to generate an image of the three dimensional object from the specified viewpoint (see Nakagawa abstract).

Applicant submits that Nakagawa describes making use of only one or possibly two images of a three dimensional object combined with information about the angle of the line of sight from the desired viewpoint to prepare an image for presentation as if viewed from the desired viewpoint. For example, at column 3, line 46 through line 65, Nakagawa discloses acquiring and storing images of a three dimensional object 7 from positions at predetermined intervals along one or more curves 8 on a curved surface that encompasses part or all of the three dimensional object. An image from any arbitrary viewpoint is created by first finding two addresses. The first address is determined by finding the point of intersection (point P of Fig. 4) of the line-of-sight from the viewpoint to the curve 8 and then calculating an angle ($\Delta\theta$ of Fig. 4) between a line connecting the

intersection point P to the "center" of the three dimensional object (O of Fig. 4) and a line connecting the viewpoint to the "center" of the three dimensional object O. The second address is determined by calculating an angle (ϕ' of Fig. 4) between the line-of-sight from the viewpoint and a line connecting the intersection point P with the "center" of the three dimensional object O. The image from the viewpoint is then created by selecting an image of the object from storage related to the intersection point P using the first address information $\Delta\theta$ and combining it with the second address information ϕ'.

Applicant submits that it is only in a situation in which no image is available at the particular intersection point P that Nakagawa discusses performing image interpolation. In this case, Nakagawa chooses two images that are most closely related to the intersection point P (i.e. adjacent images on the curve 8) and uses a trajectory of points between those two images to calculate an interpolated image that can be used for the image of the object as seen from the intersection point P (as determined from the first address information $\Delta\theta$. This image can then be combined (shifted or adjusted) according to the second address ϕ' to prepare the image from a particular viewpoint.

Applicant submits that Nakagawa refers to the use of the first and second address information to generate an image from the viewpoint as a "combination" (for example, see column 3, line 62), whereas Nakagawa uses the term "interpolate" when discussing the calculation of an image to be used as the image of the object from the intersection point P (see column 4, line 24). Thus, at best, Nakagawa describes a situation in which two images are interpolated to find an intermediate image.

This is further evidenced at column 5, line 15 -19, where Nakagawa describes "the image generation processing unit 4 combines the image information read from the memory unit 2 in accordance with the read addresses (first and second addresses) to generate an image of the three dimensional object as seen from the specified viewpoint" and then later at column 5, line 46-50, where Nakagawa describes "the image generation processing unit 4 is configured to interpolate between images based on the

trajectories connecting identical points of the three dimensional object 7 in images stored in the memory unit 2" (emphasis added). The "images stored in the memory unit 2" are those collected and stored prior to the calculation of the first and second addresses. Interpolation is only used when the intersection point P is between acquired images and two adjacent images must be interpolated to generate a single image at the intersection point P.

In contrast to Nakagawa, embodiments of the present invention function by performing interpolations between two image pairs to generate an intermediate frame and do not rely on calculations of angles or "addresses". Applicant submits that Nakagawa does not teach or suggest the "acquiring a second image pair, comprising two key frames, and second corresponding point data between the two key frames of the second image pair" as claimed in, for example, claim 1.

Based on the foregoing, applicant submits that claim 1 is in condition for allowance. For at least similar reasons, applicant submits that claims 9, 13 and 20 are also in condition for allowance. Claims 2-8, 10-12, 14-19 are dependant on one of claims 1, 9 and 13, and as such, and for the additional limitations described therein, are also in condition for allowance.

As a particular example, referring to claim 7, Applicant submits that Nakagawa does not teach or suggest a situation in which key frames are images from a same view point but at different times. Applicant submits that references in Nakagawa to "a moving there dimensional object" (see column 4, lines 35-51) relate merely to the idea that for a specific viewpoint, an image of the moving object at a point in time can be determined using the same method as above but by considering that the curve 8 is moved at the same time as the object such that the first and second addresses can be calculated in a similar way Applicant submits that Nakagawa does not consider having images from different points in time.

New claim 21 has been added to further clarify an additonal aspect of the

invention. Applicant submits that the references do not teach or suggest the advance calculation of corresponding point files as described at page 65, lines 20 to 26 in the specification and claimed in claim 21. As such, claim 21 is believed to be in condition for allowance.

Conclusion:

In view of the foregoing amendments and remarks it is respectfully submitted that this application is in condition for allowance. Favourable consideration and prompt allowance are earnestly solicited.

Respectfully submitted,

Ralph A. Dowell
Registration No. 26,868

Dowell & Dowell, P.C.
Suite 406
2111 Eisenhower Avenue
Arlington, Virginia 22314
U.S.A.

Telephone (703) 415-2555
Facsimile (703) 415-2559

Date: January 28, 2005

NH/sc
B&P: 14376-36